

CLAIMS

What is claimed is:

1. A semiconductor device, comprising:

a first semiconductor package, in which a plurality of first joining points are formed, the first joining points including different areas for protruding electrodes; and

a second semiconductor package, in which a plurality of second joining points are formed, the second joining points including different areas for the protruding electrodes and being arranged so as to be opposed to the respective first joining points.

2. The semiconductor device according to claim 1, wherein the areas of each of the joining points are opening areas of an insulating layer on lands with which the protruding electrodes are joined.

3. The semiconductor device according to claim 1, wherein the areas of each of the joining points are gradually changed from a central portion toward an outer peripheral portion of the semiconductor package.

4. The semiconductor device according to claim 1, wherein as an interval between the first semiconductor package and the second semiconductor package becomes larger, the areas of the first joining points and the areas of the second joining points gradually become smaller.

5. The semiconductor device according to claim 1, wherein volumes of the protruding electrodes connected to each of the plurality of joining points are substantially the same.

6. A semiconductor device, comprising:
a first semiconductor package; and
a second semiconductor package, stacked on the first semiconductor package through a plurality of protruding electrodes including different volumes.

7. The semiconductor device according to claim 6, wherein the volumes of the protruding electrodes are gradually changed from a central portion toward an outer peripheral portion of the semiconductor packages.

8. The semiconductor device according to claim 7, wherein as an interval between the first semiconductor package and the second semiconductor package becomes larger, the volumes of the protruding electrodes gradually become larger.

9. The semiconductor device according to claim 6, wherein each of the protruding electrodes has different amounts of conductive paste.

10. The semiconductor device according to claim 1, wherein:

the first semiconductor package comprises:
a first carrier substrate; and

a first semiconductor chip, flip-chip mounted on the first carrier substrate, and

the second semiconductor package, comprises:

a second carrier substrate, mounted on the first carrier substrate through the protruding electrodes so as to be held above the first semiconductor chip;

a second semiconductor chip, mounted on the second carrier substrate; and

a sealing material sealing the second semiconductor chip.

11. The semiconductor device according to claim 10, wherein the first semiconductor package comprises a ball grid array with the first semiconductor chip, flip-chip mounted on the first carrier substrate, and the second semiconductor package comprises any of a ball grid array and a chip-size package, in which the second semiconductor chip mounted on the second carrier substrate is mold-sealed.

12. An electronic device, comprising:

a first carrier substrate, in which a plurality of first joining points are formed, the first joining points including different areas for protruding electrodes;

a first electronic component, flip-chip mounted on the first carrier substrate;

a second carrier substrate, in which a plurality of second joining points are formed, the second joining points including different areas for the protruding

electrodes and being arranged so as to be opposed to the first joining points;
a second electronic component, mounted on the second carrier substrate; and
a sealing material sealing the second electronic component.

13. An electronic device, comprising:
a first carrier substrate;
a first electronic component, flip-chip mounted on the first carrier substrate;
a second carrier substrate, mounted on the first carrier substrate through a plurality of protruding electrodes including different volumes, so as to be held above the first electronic component;
a second electronic component, mounted on the second carrier substrate; and
a sealing material sealing the second electronic component.

14. A semiconductor package, wherein areas of joining points of protruding electrodes joined with one package are changed corresponding to a warping of another package connected to the one package.

15. An electronic apparatus, comprising:
a first semiconductor package, in which a plurality of first joining points are formed, the first joining surfaces including different areas for protruding electrodes;

a second semiconductor package, in which a plurality of second joining points are formed, the second joining points including different areas for the protruding electrodes and being arranged so as to be opposed to the first joining points; and

a motherboard, on which the first semiconductor package is mounted.

16. An electronic apparatus comprising:

a first semiconductor package;

a second semiconductor package, stacked on the first semiconductor package through a plurality of protruding electrodes including different volumes; and

a motherboard, on which the first semiconductor package is mounted.

17. A manufacturing method of a semiconductor device, comprising:

forming first openings including different opening areas in an insulating layer on first lands provided on a first semiconductor package;

forming second openings including different opening areas in an insulating layer on second lands provided on a second semiconductor package;

forming protruding electrodes on the second lands, on which the second openings are formed; and

stacking the second semiconductor package on the first semiconductor package by joining the protruding electrodes formed on the second lands onto the first lands.

18. A manufacturing method of a semiconductor device, comprising:
forming conductive materials including different thicknesses on a first semiconductor package by applying the conductive materials via a printing mask having a printing surface whose mask thickness varies;

forming protruding electrodes on a second semiconductor package; and
stacking the second semiconductor package on the first semiconductor package by joining the protruding electrodes formed on the second semiconductor package with the first semiconductor package via the conductive materials.

19. A manufacturing method of a semiconductor device, comprising:
forming conductive materials including different thicknesses on a first semiconductor package by controlling to-be-applied amounts of the conductive materials;

forming protruding electrodes on a second semiconductor package; and
stacking the second semiconductor package on the first semiconductor package by joining the protruding electrodes formed on the second semiconductor package with the first semiconductor package via the conductive materials.

20. A manufacturing method of an electronic device, comprising:
forming first openings including different opening areas in an insulating layer on first lands provided on a first carrier substrate;
mounting a first electronic component on the first carrier substrate;

forming second openings having different opening areas in an insulating layer on second lands provided on a second carrier substrate;

mounting a second electronic component on the second carrier substrate;

forming protruding electrodes on the second lands, on which the second openings are formed; and

stacking the second carrier substrate on the first carrier substrate by joining the protruding electrodes formed on the second lands onto the first lands.

21. A manufacturing method of an electronic device, comprising:

mounting a first electronic component on a first carrier substrate;

forming conductive materials including different thicknesses on the first carrier substrate by applying the conductive materials via a printing mask having a printing surface whose mask thickness varies;

mounting a second electronic component on a second carrier substrate;

forming protruding electrodes on the second carrier substrate, on which the second electronic component is mounted; and

stacking the second carrier substrate on the first carrier substrate by joining the protruding electrodes formed on the second carrier substrate with the first carrier substrate via the conductive materials.

22. A manufacturing method of an electronic device, comprising:

mounting a first electronic component on a first carrier substrate;

forming conductive materials including different thicknesses on the first carrier substrate by controlling to-be-applied amounts of the conductive materials;

mounting a second electronic component on a second carrier substrate;

forming protruding electrodes on the second carrier substrate, on which the second electronic component is mounted; and

stacking the second carrier substrate on the first carrier substrate by joining the protruding electrodes formed on the second carrier substrate with the first carrier substrate via the conductive materials.